

This listing of claims will replace all prior versions, and listings, of claims in the application.

**Listing of Claims:**

1-23. (canceled).

24. (previously added) A double balanced mixer comprising:

a local oscillator balun for receiving a local oscillator signal at a local oscillator port, the local oscillator balun having first, second, third and fourth windings, the first and third windings connected to the local oscillator port;

a radio frequency balun for receiving an RF signal at an RF port, the radio frequency balun having fifth, sixth, seventh and eighth windings, the fifth and eighth windings connected to the RF port;

an intermediate frequency balun for providing an intermediate frequency signal at an intermediate frequency port, the intermediate frequency balun having ninth, tenth, eleventh and twelfth windings, the intermediate frequency port connected to the tenth and eleventh windings;

a first diode ring connected to the first and fourth windings and further connected to the ninth and eleventh windings;

a second diode ring connected to the first and fourth windings and further connected to the tenth and twelfth windings; and

the fifth winding series connected to the ninth winding, the eighth winding series connected to the twelfth winding, the diode rings mixing the local oscillator signal and the RF signal to produce the intermediate frequency signal.

25. (previously added) The double balanced mixer according to claim 24, wherein the second and sixth windings each have a pair of ends that are connected to ground.

26 (new) A double balanced mixer for mixing an RF signal with a local oscillator signal to provide an intermediate frequency signal, comprising:

- a local oscillator balun having a first input port for receiving a local oscillator signal;

- a radio frequency balun having a second input port for receiving an RF signal;

- an intermediate frequency balun connected in series to the radio frequency balun, the intermediate frequency balun having an output port;

- a first diode ring;

- a second diode ring, the first and second diode rings connected in parallel, the first and second diode rings further connected across the local oscillator balun and the intermediate frequency balun, the diode rings mixing the local oscillator signal and the RF signal to produce the intermediate frequency signal at the output port.

27. (new) The double balanced mixer according to claim 26, further comprising:

the intermediate frequency balun having a first and second transformer, the first transformer having a first winding and a second winding, the second transformer having a third winding and a fourth winding;

the radio frequency balun having a third and fourth transformer, the third transformer having a fifth winding and a sixth winding, the fourth transformer having a seventh winding and an eighth winding;

the first winding being connected in series with the fifth winding and the fourth winding being connected in series with the eighth winding.

28. (new) The double balanced mixer according to claim 27, further comprising:

the second and third windings being connected to the output port.

29. (new) The double balanced mixer according to claim 27, further comprising:

the sixth and seventh windings being connected to ground.

30. (new) The double balanced mixer according to claim 27, further comprising:

the first and third windings being connected to the first diode ring;

the second and fourth windings being connected to the second diode ring.

31. (new) A double balanced mixer for mixing an RF input signal with a local oscillator signal to provide at an output an intermediate frequency signal, comprising:

a first diode ring having a first, second, third and fourth nodes;

a second diode ring having a fifth, sixth, seventh and eighth nodes;

a local oscillator balun for receiving a local oscillator signal at a local oscillator port, the local oscillator balun having first, second, third and fourth windings, the first winding having one end connected to the local oscillator port and the other end connected to the first node, the second winding having both ends connected to ground, the third winding having one end connected to the local oscillator port and the other end connected to ground, the fourth winding having one end connected to ground and the other end connected to the eighth node;

a radio frequency balun for receiving an RF signal at an RF port, the radio frequency balun having fifth, sixth, seventh and eighth windings, the fifth winding having one end connected to the RF port, the sixth winding having both ends connected to ground, the seventh winding having one end connected to the RF port and another end connected to ground, the eighth winding having one end connected to ground; and

an intermediate frequency balun for providing an intermediate frequency signal at an intermediate frequency port, the intermediate frequency balun having ninth, tenth, eleventh and twelfth windings, the ninth winding having one end series connected to the fifth winding and another end connected to the second node, the tenth winding having one end connected to the sixth node and another end connected to the intermediate frequency port, the eleventh winding having one end connected to the third node and another end connected to the intermediate frequency port, the twelfth winding having

one end connected to the seventh node and another end connected to the eighth winding.

32. (new) The double balanced mixer according to claim 31, wherein each diode ring comprises:

- a first diode having an anode and a cathode;
- a second diode having an anode and a cathode, the cathode of the first diode connected to the anode of the second diode;
- a third diode having an anode and a cathode, the cathode of the second diode connected to the anode of the third diode; and
- a fourth diode having an anode and a cathode, the cathode of the third diode connected to the anode of the fourth diode and the cathode of the fourth diode connected to the anode of the first diode.

33. (new) The double balanced mixer according to claim 31, wherein parasitic elements of the local oscillator signal are cancelled in the intermediate frequency and radio frequency baluns.

34. (new) The double balanced mixer according to claim 31, wherein isolation between the local oscillator signal and the RF and intermediate frequency signals is increased.

35. (new) A double balanced mixer, comprising:

a first mixer having first, second, third and fourth nodes;

a second mixer having fifth, sixth, seventh and eighth nodes, the second mixer coupled in parallel with the first mixer, the fourth node being connected with the eighth node;

a local oscillator balun operable to receive a local oscillator signal, the local oscillator balun having a first transformer and a second transformer, the first transformer connected to the first node and the fifth node, the second transformer connected to the fourth node and the eighth node;

a RF balun operable to receive a RF signal, the RF balun having a third transformer and a fourth transformer;

an intermediate frequency balun operable to provide an intermediate frequency signal, the intermediate frequency balun having a fifth and a sixth transformer, the fifth transformer connected between the third transformer and the second node and the sixth node, the sixth transformer connected between the fourth transformer and the third node and seventh node.

36. (new) The double balanced mixer according to claim 35, wherein the first and second mixers are each ring diodes.

37. (new) The double balanced mixer according to claim 36, wherein the ring diodes each comprise four diodes.